Digital Television Set with Gaming System Emulating a Set Top Box

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Field of the Invention

The present invention generally relates to video service systems, and more specifically to systems combining access to gaming services with access to digital television broadcast and access to the Internet.

Background of the Invention

A recent advancement in the area of communication media is digital television (DTV) broadcast, which is transmission of television signals using digital rather than conventional analog methods. DTV offers many advantages over analog TV, including superior image resolution for a given bandwidth, smaller bandwidth for a given image resolution, compatibility with computers and the Internet, superior audio quality, consistency of reception over varying distances, capacity for multicasting, and interactivity and interactive TV (ITV). To access DTV and ITV services, a DTV set including a set-top box as well as a receiver is necessary to television viewers, who wish to use their current analog television sets to receive digital broadcasts. The two standards of display formats for digital television transmissions are standard definition television (SDTV) and high definition television (HDTV). Presently, DTV in the HDTV format is often intertwined with Satellite TV, since cable providers across the US are lagging behind, and making HDTV set owners turn to off-the-air broadcasts and satellite television.

At the same time, new and exciting developments are taking place in computer gaming using gaming consoles (GC), and especially in interactive on-line computer gaming.

During the last couple of years, on-line computer gaming has gained increasing popularity, and today thousands of players are playing on-line all around the world. Many people stereotype these players as techno kids only, but this could not be more wrong. Both females and males of all ages can be found daily trying to out-think, out-maneuver, or just having a good time on-line. It is predictable that interactive on-line computer gaming will blur the line between games and other entertainment or communication media, and that the avenues explored in the development of on-line gaming might well break new ground for interactive Internet applications in all areas of business relations and social life.

The idea of combining gaming and television experiences is not a new concept. Nevertheless, the general idea is under continuous development, and new improvements are constantly introduced. For example, in US Pat. No 6,264,559 to Lawrence et al., issued July 24, 2001, an interactive television system is described. The interactive television system includes a set top box and a remote control unit having an input device and control logic. The control logic processes input signals to transmit television control signals to control television programming, and is configured to execute game software instructions stored on a local medium and to process input signals to play the game. Further, the set top box interacts with the remote control unit during gaming.

However, all of the known systems combining gaming and television experiences have in common that a gaming console (GC) adapts a game for being played on an analog television set. If the analog television set is further used to receive digital television broadcast, an additional DTV set is needed to receive a digital television signal, and to adapt the digital television signal to be capable of display on an analogue television or to extract data from a digital television signal for display on a television.

Object of the Invention

It is therefore an object of the instant invention to provide a digital television set that is more commonly available and at a reduced cost to a consumer.

Summary of the Invention

In accordance with an aspect of the instant invention, there is provided a digital television set system comprising a receiver for receiving digital television signals from at least a communication channel; and a gaming console for use as a gaming client, the gaming console connected to the receiver and comprising: at least a volatile storage medium for having stored therein client instruction data relating to a gaming client and game instruction data relating to a current game in execution; at least an external storage medium reading circuit for sensing data from an external storage medium and for storing the received data in the at least a volatile storage medium; and at least a processor in communication with the at least a volatile storage medium, the processor for retrieving game instruction data therefrom for executing a game on the gaming console, and for retrieving client instruction data therefrom for executing a gaming client function on the gaming console; wherein when set-top client instruction data and set-top application instruction data are stored in the at least a storage medium and are executed on the at least a processor, the gaming console emulates a set-top box for use in displaying video information extracted from digital television signals.

In accordance with an aspect of the instant invention, there is further provided a method for emulating a set-top box on a gaming console, the gaming console being part of digital television set system and coupled to a receiver for receiving digital television signals from at least a communication channel, the gaming console comprising at least a processor and at least a storage medium, and being in connection with a monitor and a sound system, the method comprising the steps of receiving first instruction data from an external storage medium read by the gaming console and including one of set-top instruction data for receiving and decoding digital broadcast data when executed on the gaming console and communication data for use in retrieving via the receiver the set-top instruction data for receiving and decoding digital broadcast data when executed on the gaming console; executing the set-top instruction data on the gaming console; receiving encoded digital broadcast data via the receiver; decoding the received, encoded digital

broadcast data; and displaying the decoded digital broadcast data on the monitor and on the sound system.

Brief Description of the Drawings

An exemplary embodiment of the present invention will be described in conjunction with the following drawings, in which similar reference numbers designate similar items:

Figure 1 shows a schematic diagram of a digital television system;

Figure 2 shows a schematic diagram of a gaming console according to the instant invention;

Figure 3 displays a flow chart illustrating a procedure of playing a game on a gaming console;

Figure 4 displays a flow chart illustrating a procedure of emulating a set-top box with a gaming console; and

Figure 5 displays a flow chart illustrating a procedure of emulating a set-top box with a gaming console, and considering aspects of conditional access.

Detailed Description of the Invention

The instant invention is now described with respect to a specific embodiment thereof, in which a DTV system includes a gaming console configured to operate as a set-top box. Of course, the invention described herein is not restricted to a particular example, which will be described in what follows, but equally applies to other gaming devices emulating set-top boxes.

Referring to Figure 1, shown is a schematic diagram of a digital television (DTV) system **10** for use with a conventional analog television set. The DTV system **10** comprises a set-top box type unit **20**, a receiver unit **22**, and an interface **24**. The set-top box type unit **20** fulfils the function of a set-top box. It is for example a genuine set-top box, or a gaming

console emulating a set-top box. A set-top box type unit (STB) is to be understood as electronic device designed to produce output on a conventional television set connected to some communications channels such as telephone, ISDN, optical fibre, or cable. Optionally, the STB runs software to allow the user to interact with the programs shown on the television in some way. The receiver unit **22** receives DTV signals from a communication channel, and passes the DTV signal to the set-top box type unit. Optionally, the STV signals are related to satellite television broadcast. The set-top box type unit **20** and the receiver unit **22** are coupled by an interface **24**. The interface **24** is for example an IEEE 1394-1995 interface (a 1394 interface). The 1394 interface creates a two-way digital bus architecture. Digital devices are possibly daisy-chained together as opposed to using point-to-point connections. The 1394 interface is not only a set-top box to receiver connection, but it possibly connects several digital devices. A person of skill in the art easily envisions other interfaces. Further, the set-top box type unit **20**, the receiver unit **22**, and the interface **24** form a single integrated DTV set system **10**.

As mentioned before, it is possible that a gaming console emulating a set-top box is used as set-top box type unit **20**. Referring now to Figure 2, a schematic diagram of a gaming console (GC) according to the instant invention is shown. The gaming console **100** includes at least a storage medium **110**, at least a processor **120**, and a transceiver **130**. The at least a storage medium **110** is for storing game instruction data relating to a current game in execution on the GC **100**, as well as for storing client instruction data relating to a gaming client, the gaming client selecting and coordinating events taking place on the gaming console **100**. Preferably, the gaming client is an ultra-thin client (UTC). The storage medium **110** comprises at least one of non-volatile random access memory, random access memory, and read-only memory. The at least a processor **120** is in communication with the storage medium **110** for receiving client instruction data and game instruction data, the client instruction data and the game instruction data to be executed on the at least a processor **120**. Further, the at least a processor **120** includes at least an external storage medium reading circuit for sensing data from an external storage medium and for storing the received data in the at least a storage medium **110**. The external storage medium is either a local external storage medium, or a remote external storage medium. For example, service provider facilities serve as remote external storage

medium, and are accessed via a network. The transceiver **130**, being in communication with the at least a storage medium **110**, is for establishing a connection to at least one network, the at least one network possibly being a broadband access network. A gaming service provider possibly offers services over the at least one network. Preferably, the connection to the at least one network is established via a receiver, the receiver being in communication with at least a communication channel. The gaming service provider offers client instruction data and/or game instruction data, which are loaded over the at least one network into the at least a storage medium **110**. Optionally, the GC **100** is in communication with an external storage medium **140**, the external storage medium being a compact disc, read-only memory cartridge, or any other storage medium, for receiving client instruction data and/or game instruction data from the external storage medium **140**, the data to be stored in the at least a storage medium **110**, and to be executed by the at least a processor **120**. The gaming console **100** is in communication with a monitor **150** and with a sound system **160**, for displaying graphical images and sound, both produced by the at least a processor **120**, when executing client instruction data and game instruction data. Optionally, the monitor is a monitor included in a television set. Additionally, the GC **100** is in connection with peripheral devices such as a keyboard, joysticks, and the like (not shown). Further optionally, the gaming console **100** comprises an interface **170** for accepting a smart card, or a related security device, the interface in communication with the at least a storage medium **110** and the at least a processor **120**. The GC also includes another transceiver **131** being coupled to a television signal receiver **521** via an interface **511**. Preferably, the television signal receiver is a satellite television signal receiver. Optionally, the transceiver **130** and the other transceiver **131** are a same transceiver.

Referring now to Figure 3, a flow chart is shown illustrating a procedure **20** for playing a game on the gaming console **100**. In a first step **201**, client instruction data (CID) a received, and stored in the at least a storage medium **110**. The CID is received over a network, or from the external storage medium **140**. Alternatively, the CID is received only once, and is stored in a non-volatile random access memory section of the at least a storage medium **110**. Further alternatively, existing CID is replaced and/or updated by new CID. The CID is executed by the at least a processor **120**, step **202**. A gaming client

is now running on the gaming console **100**. The gaming client selects and coordinates events taking place on the gaming console. Next, gaming instruction data (GID) are received, step **203**. The at least a processor **120** executes the GID, step **204**. A game is now in execution on the gaming console **100**. The steps **201, 202, 203,** and **204** are either executed sequential, or they are executed in parallel. Also, depending on the nature of the CID and GID, the procedure possibly steps back to a step previously performed, and repeats the step.

Typically, all the CID and GID are a same application loaded from a storage medium and for, in execution, providing a user with a desirable gaming experience. As such, it might be considered that the CID and GID are a same dataset. That said, for ease of description and reference, they will be labeled separately herein.

When the client instruction data (CID) and the game instruction data (GID) stored in the at least a storage medium **110** are for emulating a set-top box - set-top client instruction data (STCID) and set-top game instruction data (STGID), and when the set-top client instruction data (STCID) and set-top game instruction data (STGID) are executed by the at least a processor **120**, the gaming console **100** emulates a set-top box. Generally, a set-top box is either a device that enables a television set to run applications related to the Internet and/or a device that enables a television set to receive and decode digital television (DTV) broadcasts. However, set-top boxes are not restricted to be used with televisions sets only, but for example are used with gaming consoles connected to a monitor and a stereo. In the Internet realm, a set-top box emulates a specialized computer for communication with the Internet. It contains a Hypertext Transfer Protocol (HTTP) client, *i.e.* a Web browser, and it runs the Internet's main protocol, *i.e.* the Transmission Control Protocol/Internet Protocol (TCP/IP). The service to which the set-top box is attached, is possibly provided through a telephone line, through a cable TV company network, or through any other broadband access network. In the DTV realm, a typical digital set-top box contains at least a processor for running an operating system, possibly Linux or Windows CE, and for parsing a digital data transport stream. A set-top box also includes random access memory, and is capable of decoding and processing the digital data transport stream. Optionally, set-top boxes contain a hard drive for storing recorded

television broadcasts, for downloaded software relating to set-top box operation, and for other applications provided by a DTV service provider.

When emulating a set-box, the set-top client instruction data (STCID) relate to a set-top client, which when executed by the at least a processor **120**, fulfills the tasks of connecting to a network, and of receiving a digital data transport stream. The set-top game instruction data (STGID) relate to a "game" of decoding a digital data transport stream, and displaying the decoded data. For example, the DTV broadcast signal is most often offered in the Moving Picture Experts Group (MPEG) format. Thus, when executing the set-top game instruction data, the at least a processor **120** functions as an MPEG decoder. Further, the at least a processor **120** also functions as a processor for audio decoding and processing. Optionally, game instruction data (GID) and the set-top game instruction data (STGID) are application instruction data (AID) and set-top application instruction data (STAID), referring to any application received, stored, and executed on the gaming console **100**.

Referring now to Figure 4, a flow chart is presented illustrating a procedure **30** of emulating a set-top box with a gaming console. The procedure **30** is related to the above-described procedure **20**, and exemplifications and illustrations made for the procedure **20** equally apply to the procedure **30**. In a first step **301**, set-top client instruction data (STCID) and set-top game instruction data (STGID) are received and stored in the at least a storage medium **110**. STCID and STGID are optionally received from a receiver in connection with the gaming console **100**, the receiver in communication wit at least a communication channel, or they are received from an external storage medium **140**. Next, STICD and the STGID are executed by the at least a processor **120**, step **302**. The gaming console **100** now emulates a set-top box. For example the executable instructions define which data formats are possibly supported by the emulated set-top box, and contains information about how to decode an encoded data stream received by the gaming console **100**, the gaming console emulating a set-top box. Next, the GC **100** receives an encoded data stream, step **304**, and decodes the encoded data stream, step **305**. The encoded data stream is for example a MPEG data stream relating to a DTV broadcast. In step **306**, the GC **100** provides output data for visualization and audio presentation. The output data are

provided to the monitor **150** and to the sound system **160**. Providing output data is equivalent to displaying video information extracted from the decoded data stream. It will be apparent to those of skill in the art that current GCs are provided with powerful video processors for use in game execution.

When offering DTV services, the question of conditional access (CA) deserves special attention. CA is a technology used to control access to DTV services to authorized users by encrypting transmitted programs. CA has for example been used for years for pay-TV services, following standards developed by the Advanced Television Systems Committee (ATSC), an organization that was created in 1982 to promote the establishment of technical standards for all aspects of advanced television systems. There are numerous ATSC compliant CA systems available for a broadcaster to choose from. A CA system provider provides equipment and software to a broadcaster, who then implements the CA system into his equipment. CA is not designed solely for DTV. It can be used for digital radio broadcasts, digital data broadcasts, and non-broadcast information and interactive services.

A CA system includes several basic components. The subscriber management system (SMS) is a subsystem of the CA system that manages the subscriber's information and requests entitlement management messages (EMM) from a subscriber authorization system (SAS). EMM provides general information about a subscriber and status of the subscription. The SAS is a subsystem of the CA system that translates information about the subscriber into an EMM at a request of the SMS. The SAS also ensures that a subscriber's security module receives authorization needed to view a program. Further, the SAS acts as a backup system in case of failure. A security module, usually in the form of a smart card, extracts the EMM and an entitlement control message ECM necessary for decrypting transmitted programs. The security module is either embedded within a set-top box or in a PC card that plugs into a set-top box. Optionally, when a gaming console is used to emulate a set-top box, the security module in incorporated into the gaming client, and is loaded as part of the set-top client instruction data.

Referring now to Figure 5, a flow chart is displayed illustrating a procedure **40** illustrating a method of emulating a set-top box with a gaming console under consideration of conditional access (CA). . The procedure **40** is related to the above-described procedure **30**, and exemplifications and illustrations made for the procedure **30** equally apply to the procedure **40**. The first steps of procedure **40**, receiving STCID, step **401**, executing STCID, step **402**, and receiving STGID, step **403**, are similar to the corresponding steps of procedure **30**. After executing steps **401**, **402**, and **403**, the gaming console **100** is conditioned and in a state of emulating a set-top box. Next, a conditional access module (CAM) is received, step **404**. The CAM is optionally received over the network or from on external storage medium. The CAM is a client running on the at least a processor **120** for verifying access authorization of the gaming console **100**, and for descrambling a scrambled data stream. Next, the CAM verifies for access authorization, step **414**. For example, the CAM verifies the validity of an access code providing from a smart card, the smart card in communication with the at least a processor **120** and the at least a storage medium **110** through the interface **170**. A person of skill in the art envisions with ease other methods of authorization access verification. Next, a scrambled, encoded data stream is received, step **404**. The CAM descrambles the scrambled, encoded data stream, step **415**. The descrambled, encoded data stream is decoded, step **405**, the step being performed by the set-top game instruction data in execution by the at least a processor **120**. In step **406**, the GC **100** provides output data for visualization and audio presentation. The output data are provided to the monitor **150** and to the sound system **160**. Providing output data is equivalent to displaying video information and playing audio information extracted from the decoded data stream.

Due to the widespread penetration of GCs in the marketplace, their low cost, and their general desirability, the present invention provides for another use for same, which effectively eliminates a need to purchase or otherwise pay for a separate set-top box for use with a television set. Further, the GC is then coupled to the DTV network allowing for interactive network type gaming and provision of other broadband based gaming functions.

Although the instant invention has been described with respect to a specific embodiment thereof, various changes and modifications are optionally carried out by those skilled in the art without departing from the scope of the invention. Therefore, it is intended that the instant invention encompass such changes and modifications as fall within the scope of the appended claims.